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IDENTIFIERS WAIS, *Wechsler Adult Itelligence Scale

ABSTRACT

It was hypothesized that there are significant differences in intellectual patterns between black and white populations which can be demonstrated on the Wechsler Adult Intelligence Scale (WAIS). A one-way analysis of variance was performed on the subjects' scores on the WAIS subtests and the Verbal, Peformance and Full Scale IQ using the ethnic differential as the grouping factor. When the groups were paired by Full Scale IQ, a significant difference was found between space conceptualization (performance on object assembly) and comprehension (performance on verbal tests) with blacks performing at a higher level on the latter. Generally, the research indicated that in whites the ability to abstract, to form new associations, and memory are related and in blacks the abiity to size up a situation, to analyze, and to differentiate essentials from non-essentials are related. (PR)

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SOME ETHNIC COGNITIVE PATTERNS

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White and negro subjects' scores on the WAIS subtests and the Verbal, Performance and Full Scale I. Q. were analysed via one-way analysis of variance using the ethnic differential as the grouping factor. A significant difference was found in comprehension and object assembly when the groups were paired by Full Scale I.Q. In the random sample other significant differences in pattern occurred. There are also differences in intra-racial patterns in the correlations of the subtests.

SOME ETHNIC COGNITIVE PATTERNS

Review of Other Research

There is a relationship, demonstrated repeatedly, between socio-economic level and motivation, as well as need to achieve. Middle class children perform for knowledge of results whereas lower class children require tangible rewards. (Terrill, Durkin & Wiesely, 1958-9) Performance is influenced by expectation and by past success. (Deutsch, M., I. Katz, & A. R. Jenson) Recurrent failure has led to decrement in I. Q. performance. "Studies are bringing evidence that even the anatomical structures of the central nervous system are affected in their development by encounters with circumstances. This lends credence to Piaget's (1936) aphorism that 'use is the aliment of a schema'" Pribram echoes these thoughts by saying that preverbal experience is essentiall as a basis to later problem solving. (Deutsch, M., I. Katz, & A. R. Jenson)

Jenson (Edson, Lee, 1969) has indicated that Blacks are poor in cognitive learning, i.e. abstract reasoning and good in associative learning and memory. It is pointed out that a smaller percentage of negroes score in the upper I.Q. group than whites. The study to be reported here does not wholly support this stand. It is my feeling that there is some bias in sampling although this is unlikely in the Armed Forces General Qualifications Test (U.S. News and World Report, 1966). Here 75% of the Negroes were disqualified from military service because of ability level, whereas, 25% of the whites were deferred for this reason.

In the study reported by Henning and Levy, negro delinquents showed consistent superiority in verbal I.Q. on the WISC and the WAIS while white delinquents showed consistent superiority in performance I.Q. Davidson and Greenberg found that both Negro high and Negro low achievers had significantly higher verbal than performance scores. Clarke (1941) matched I.Q.'s on a Stanford Binet Form L in a group of 116 white and 116 colored delinquent boys 14 to 16 years of age. It was found that the negroes were superior in verbal and the whites superior in reasoning and number functions. "In six of the stdies either the Wechsler Bellevue or the WAIS was the measuring instrument. There appears to be no evidence that the colored subjects scored consistently bettter or worse on the Verbal or the Performance scales" (Shuey, 1966).

Rosenfield reported that whites scored higher than Negroes on achievement tests while Tate found no significant difference between the two groups. Kaplan and Markom reported that when white and Negro children were matched socio-economically, the whites scored higher on intelligence and reading tests than the Negroes. "In general, white subjects scored significantly higher on both convergent and divergent tasks. However, reversals of this tendency were noted on certain tests for the lower socio-economic group." (Jackson) Racial differences were noted only in the lower classes while all social class differences were significant in the study made by Tulkin and Newbrough.

According to Derrick's study, "16% of the colored were above the white mean [on a 1916 Binet test]. Negroes were better in memory and concrete and routine problems than those involving abstractions and reconstruction. The average home environment of the colored was inferior to that of the white subjects." Griggsby, utilizing the Ohio State Psychological Examination at Ohio State University, found the "median percentile of Negroes [to be] 39.5 instead of 50 as it would be if the distribution of colored were the same as that for all entering freshmen." Shuey records that the "negro functions on a lower level than whites in situations of an abstract nature," from Patrick and Sims study.

"Several authors were quoted (Shuey) as finding the colored relatively better on common sense, concrete material than on tests involving abstract concepts." That academic background is a large factor in test performance, cannot be overlooked, especially on the Army Alpha. Here literacy definitely has a bearing on performance.

In refutation of the argument that cultural bias is a factor in performance, Osborne (1960) learned that "on the culturally weighted verbal tests colored children held their own, but on nonverbal items involving only number combinations the overlap between the two racial groups was virtually eliminated at the last testing." (Shuey) Repeated studies show, beyond a reasonable doubt, that both white and colored populations from rural areas, as compared to urban areas, score lower on I.Q. tests.

Negro intelligence seems to drop with increasing age (Shuey). A s was found in the present study, comprehension scores for Negroes were significantly higher than white scores on the WISC. Reiterated often is the fact that on study after study, Negro subjects are more proficient in manipulating concrete objects than in dealing with abstract ideas or verbalizations. Data presented demonstrates the relationship between cognitive process and deprivation or socio-economic status quite conclusively (Deutsch & Associates). A question in this regard, is, how do you isolate the genetic factors? They may be synonomous. Perhaps social class varies with intelligence (Deutsch, M., I. Katz & A. R. Jenson). "Groups differ in their relative standing on different functions. Each...fosters the

development of a different pattern of abilities." (Anastasi, 1958). Possibly the group fosters innate processes rather than develops them.

Stodolsky found great differences in pattern among ethnic groups on intellectual tasks. See figures 1, 2 and 3. These were also indicated in the present research though the pattern is somewhat different. The most interesting factor reported by Stodolsky is that while socio economic level produced a lower score within the ethnic group, the pattern remained consistent. This is a beautiful study which was done with children. Quoted below are their definitions of the abilities measured.

"Verbal- The skill is defined as memory for verbal labels in which reasoning elements, such as those required by verbal analogies, are reduced to a minimum. Verbal ability has long been regarded as the best single predictor of success in academic courses, especially in the language and social science fields. It is involved to a marked degree in the work of all professions and in most semi-professional areas.

"Reasoning-Reasoning involves the ability to formulate concepts, to weave together ideas and concepts, and to draw conclusions and inferences from them. It is, almost by definition, the central element of aptitude for intellectual activities and, therefore, is of primary importance in all academic fields and in most vocations.

"Number-The ability is defined as skill in enumeration and in memory and use of the fundamental combinations in addition, subtraction, multiplication, and division. It is of great importance in arithmetic in elementary schools and in mathematics in secondary schools.

"Space conceptualization-The ability refers to a cluster of skills related to spatial relations and sizes of objects and to visualizing their movements in space. It is involved in geometry, trigonometry, mechanics and drafting; in elementary school activities such as practical arts and drawing; and in occupations such as mechanics, engineering and architecture."

The only question I would raise is in regard to the validity of the tests utilized since I could find nothing in this regard in the report.

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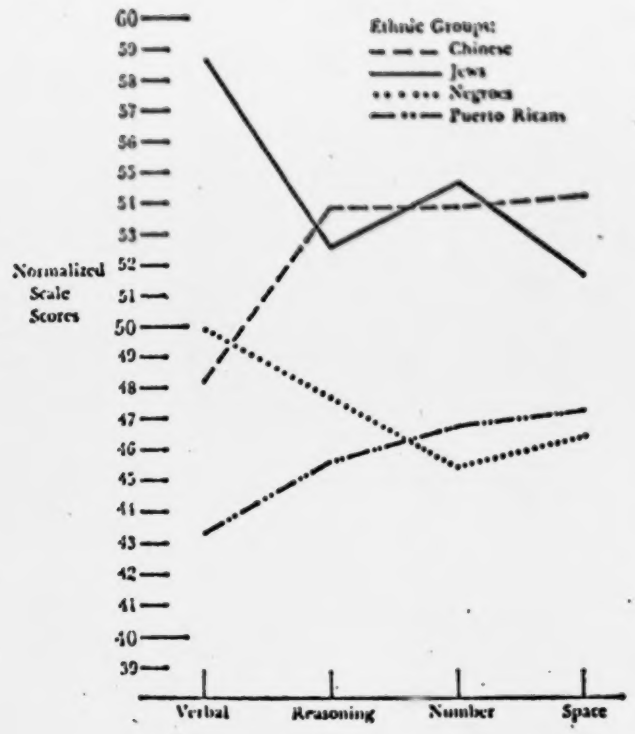

Fig. 1. Pattern of Normalized Mental-Ability Scores for Each Ethnic Group *

*from Stodolsky, page 567

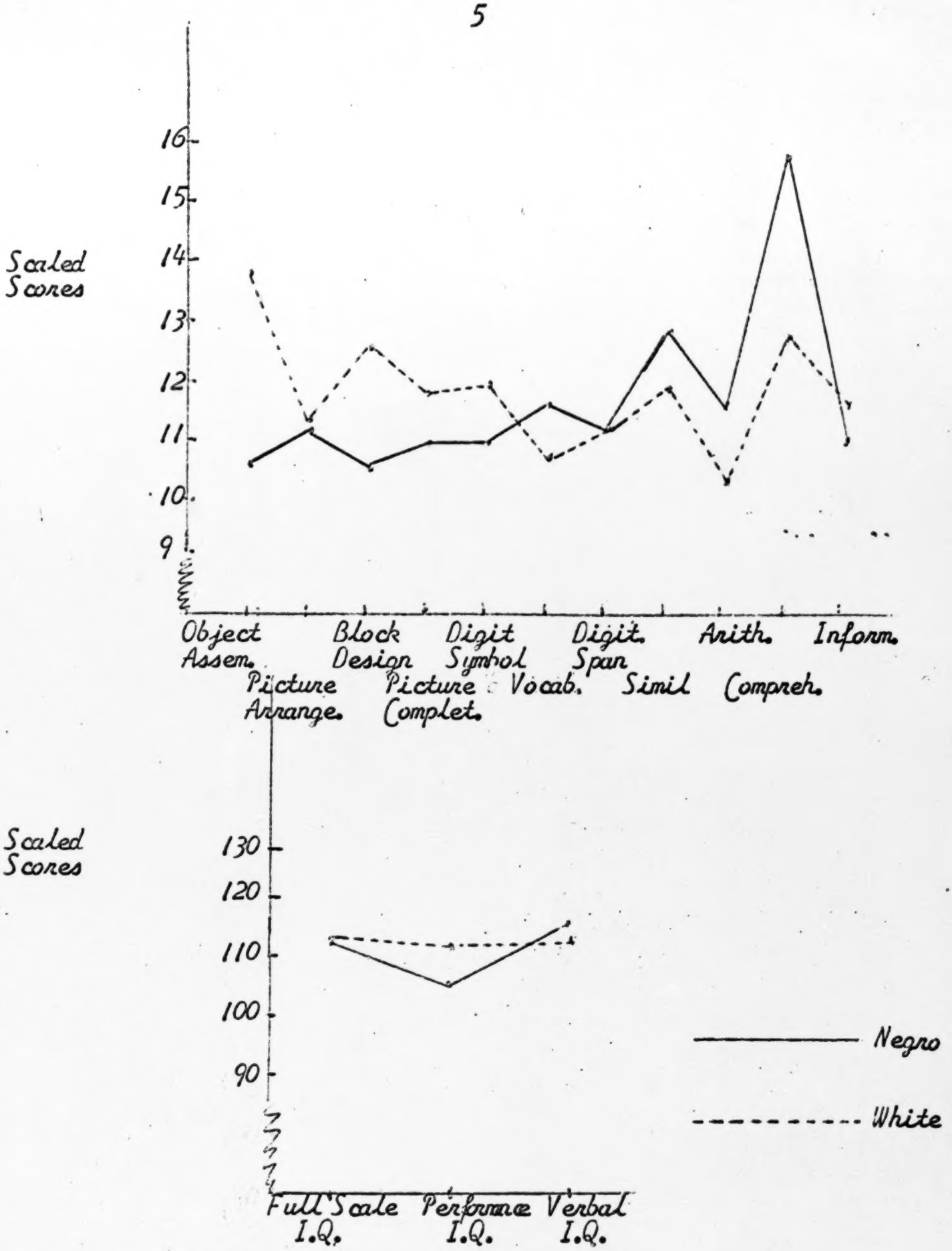

Fig. 2. Means of WAIS Scores Matched for Total Full Scale Intelligence Quotient Samples of White and Negro Subjects

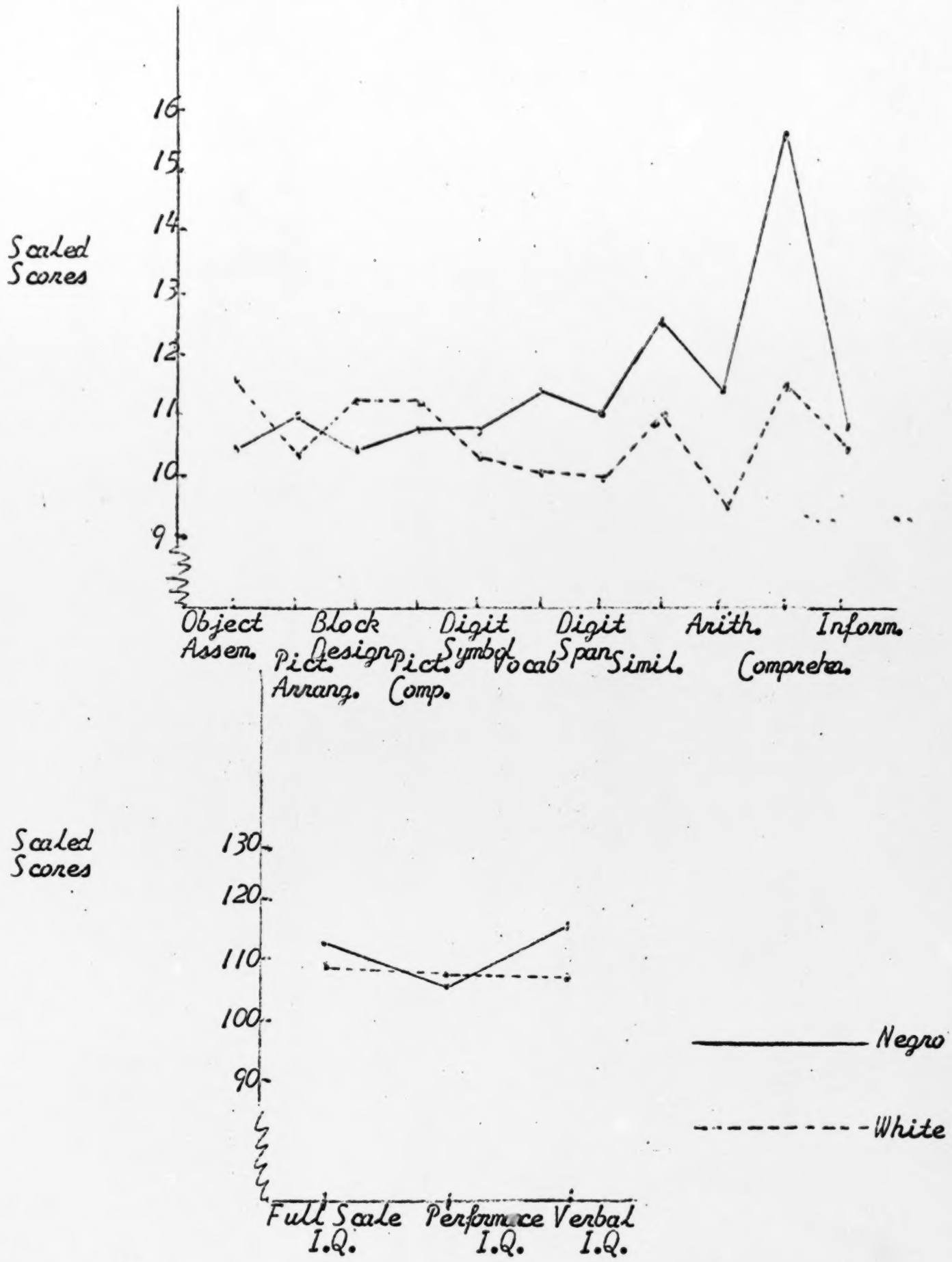

Fig. 3. Means of WAIS Scores from Random Samples of White and Negro Subjects

Procedure and Results

Basically, the hypotesis tested in the study of Negro and white populations of Columbus, Ohio was that there are significant differences in intellectual patterns between the two groups that can be demonstrated on the WAIS. Because earlier research has indicated that, on this test, sex and age are not significant factors when standardized scores are utilized (Wechsler), the only factor taken into account in matching pairs in sampling was full scale I.Q. When this was done, a difference in pattern emerged which is attributable to race. There is also a difference which shows up when random samples are utilized, as was done here. And there is a highly significant difference in the pattern correlations within each race.

When matched samples, matched for Full Scale I.Q., were tested, the mean on the comprehension test for Negroes was 15.64 and that for whites was 12.71. This difference is significant at the .05 level of probability. On the object assembly test the results indicated that the white sample was superior with a mean of 13.71 as compared to the negro mean of 10.50, a difference also significant at the .05 level of significance. See Table 1 and Figure 2 for a full exposition of the scores. As can be readily seen, the Full Scale, Verbal and Performance Intelligence Quotients are fairly equivalent from group to group with no significant differences apparent. Therefore the differences which were significant are probably due to patterning of abilities within the ethnic groups.

Upon examination of the results from the random samples in Table 2, it is noticeable that again comprehension is significantly higher for the Negro sample, here at the .01 level of probability. Similarities and Arithmetic scores also favor the Negro, significant at the .05 level of probability. However the differences in Full Scale, Verbal and Performance I.Q.s are insignificant. Again, this should indicate that these differences are due to patterning of abilities. It should be pointed out, however, that the random sample is somewhat skewed toward the higher Negro mean, since the Full Scale I.Q. mean is 108 for whites and 112.1 for Negroes--not significant, but possibly indicative of some selection in the sample.

A very interesting factor shows up on the intra-racial correlation matrices, Tables 3 and 4. Table 5 is excerpted from Tables 3 and 4 for clarity. Comprehension and similarities correlate at .07 for Blacks, and at .73 for whites! Similarities and information correlate at .76 for whites and .27 for Blacks. Information

TABLE 1

RESULTS FROM 1-WAY ANALYSIS OF VARIANCE, MEANS, STANDARD DEVIATIONS, F TESTS OF WAIS SUB TEST AND FULL TEST SCORES ON MATCHED FOR I.Q. SAMPLES OF NEGROES AND WHITES

Test	Mean		Standard Deviations		F Test
	White	Negro	White	Negro	
Information	11.5714	10.9286	2.9798	3.1735	0.3053
Comprehension	12.7143	15.6439	3.1727	3.7129	5.0341*
Arithmetic	10.2857	11.5000	2.8464	2.4729	1.3951
Similarities	11.8571	12.7857	2.6561	1.5777	1.2648
Digit Span	11.0714	11.1429	1.8590	3.0346	0.0056
Vocabulary	10.6429	11.5000	2.6777	2.7942	0.6867
Digit Symbol	11.8571	10.9286	3.5270	2.0555	0.7244
Picture Completion	11.7143	10.9286	3.4514	2.6736	0.4534
Block Design	12.5000	10.5000	2.6530	3.0064	3.4833
Picture Arrangement	11.2857	11.0714	3.5611	2.2001	0.0367
Object Assembly	13.7143	10.5000	4.0843	3.1805	5.3978*
Verbal I.Q.	112.0000	115.5714	14.4275	11.3593	0.5296
Performance I.Q.	111.5000	105.4286	12.3335	12.7020	1.6464
Full Scale I.Q.	113.0000	112.1429	12.7340	11.4613	0.0350

Note: The sample consisted of 14 Negro and 14 White subjects matched for Full Scale I. Q.
*significant at the .05 level of probability

TABLE 2

RESULTS FROM 1-WAY ANALYSIS OF VARIANCE, MEANS, STANDARD DEVIATIONS, F TESTS OF WAIS SUBTEST AND FULL TEST SCORES ON RANDOM SAMPLES, UNEQUAL CELLS, OF NEGROES AND WHITES

Test	Mean		Standard Deviations		F Test
	White	Negro	White	Negro	
Information	10.5526	10.9286	3.0817	3.1735	0.1499
Comprehension	11.6316	15.6429	3.3078	3.7129	14.0926**
Arithmetic	9.6316	11.5000	2.7452	2.4729	4.9835*
Similarities	11.1053	12.7857	2.4472	1.5777	5.6886*
Digit Span	10.0789	11.1429	2.8700	3.0346	1.3641
Vocabulary	10.1053	11.5000	2.7879	2.7942	2.5576
Digit Symbol	10.4211	10.9286	3.0459	2.0555	0.3309
Picture Completion	11.3421	10.9286	2.5918	2.6736	0.2562
Block Design	11.3684	10.5000	2.7843	3.0064	0.9541
Picture Arrangement	10.4737	11.0714	2.5966	2.2001	0.5851
Object Assembly	11.7368	10.5000	3.6516	3.1805	1.2523
Verbal I.Q.	107.4474	115.5714	14.7019	11.3593	3.4897
Performance I.Q.	106.6579	105.4286	11.6091	12.7020	0.1091
Full Scale I.Q.	108.0000	112.1429	12.4900	11.4613	1.1738

Note: The sample consisted of 14 Negro and 38 White subjects chosen at random.

**significant at the .01 level of probability

* significant at the .05 level of probability

correlates with vocabulary .77 for whites and .89 for Blacks. The white scores correlate .72 and the Blacks .27 on Arithmetic and Digit Span while vocabulary and picture arrangement correlate .24 for whites and..75 for Blacks.

The comprehension test, according to Wechsler, "depends on the possession of a certain amount of practical information and a general ability to evaluate past experience." The Blacks were significantly superior in this area.

As pointed out above, the whites were significantly superior on object assembly which gives some indication of the thinking and work habits of the subjects. It also measures initiative in seeking and achieving an unknown goal.

The difference in pattern, which was hypothesized, is very evident in Table 5. The most important differences in these patterns have been circled. Abstracting ability and general alertness to the world, including general information, seem to be highly related (.76) in the whites, but barely related (.27) in the negroes. In contrast to this, general knowledge seems to have a good relationship to Performance I.Q. (.72) for the Negro and a much lesser one (.57) for the white.

Ability to abstract and perceive commonalities seems to be highly related to common sense and ability to evaluate past experience at .73 for whites but very significantly less, .07, for Blacks! and also, interestingly, mental alertness and memory seem to be related at .72 for whites and .27 for Blacks.

While vocabulary shows very little relationship to performance for whites (.52), it is related at .70 for Blacks. It is also noticeable that vocabulary is related to ability to size up a total situation for Blacks at .76 and only at .25 for whites.

Picture completion, which correlated with performance at .71 for Blacks, .29 for ~~for~~ whites and with Full Scale I.Q. at .72 for Blacks and .42 for whites, ostensibly measures ability to differentiate essential from non-essential details. Ability to organize the whole into its component parts seems related for both whites and Negroes to Full Scale I.Q. but this is at .83 for Blacks and .63 for whites.

Overall, it would appear that in the whites the ability to abstract, to form new associations and memory are related, whereas in the Black ability to size up a situation, to analyze, and to differentiate essentials from non-essentials are related.

For the Negro, there is apparently more verbalization in performance tasks than there is for the white since vocabulary is more highly correlated to performance as is information.

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TABLE 3

CORRELATIONS OF SUBTEST SCORES FOR WHITES

	Info	Comp	Arith	Simil	Digit Span	Vocab	Digit Symbol	Picture Complet.	Block Design	Picture Arrange.	Object Assembly	Verbal I.Q.	Perf. I.Q.	Full Scale I.Q.
Info		.614	.561	.766	.493	.776	.487	.399	.489	.308	.263	.837	.571	.836
Comp	.614		.604	.733	.581	.719	.268	.393	.356	.304	.294	.849	.370	.753
Arith.	561	.604		.529	.724	.577	.388	.258	.188	.302	.163	.798	.249	.673
Simil.	766	.733	.529		.476	.791	.462	.403	.359	.290	.348	.819	.452	.777
Digit Span	.493	.581	.724	.476		.661	.352	.294	.291	.321	.257	.780	.311	.682
Vocab.	776	.719	.577	.791	.661		.364	.302	.427	.249	.250	.886	.518	.844
Digit Symbol.	487	.268	.388	.462	.352	.364		.283	.405	.265	.586	.471	.576	.580
Pict. Comp..	399	.393	.258	.403	.294	.302	.283		.139	.634	.507	.400	.288	.417
Block Dezgn	.486	.356	.188	.359	.291	.427	.405	.139		.215	.440	.386	.774	.630
Pict Arran.	308	.304	.302	.290	.321	.247	.265	.634	.215		.544	.347	.431	.468
Obj. Assem.	263	.294	.163	.348	.257	.250	.586	.507	.440	.544		.293	.630	.497
Verbal I.Q.	.837	.849	.798	.819	.780	,886	.471	.400	.386	.347	.293		.474	.901
Perf. I.Q.	.571	.370	.249	.452	.311	.518	.576	.288	.774	.431	.630	.474		.797
F. S. I.Q.	.836	.753	.673	.777	.682	.844	.580	.417	.630	.468	.497	.901	.797	

TABLE 4

CORRELATIONS OF SUBTEST SCORES FOR BLACKS

	Info	Comp	Arith	Simil	Digit Span	Vocab	Digit Symbol	Picture Complet.	Block Design	Picture Arrange.	Object Assembly	Verbal I.Q.	Perf. I.Q.	Full Scale I.Q.
Info		.729	.534	.273	.401	.889	.577	.571	.681	.695	.339	.883	.720	.893
Comp	.729		.716	.078	.346	.686	.349	.493	.575	.663	.205	.813	.565	.784
Arith.	534	.716		.168	.277	.551	.038	.506	.388	.516	.152	.731	.404	.646
Simil.	273	.078	.168		.216	.113	.161	.033	.268	.040	.284	.312	.014	.193
Digit Span	.401	.346	.277	.216		.426	.076	.286	.076	-.025	.151	.676	.164	.479
Vocab.	889	.686	.551	.113	.426		.382	.530	.572	.757	.524	.843	.702	.860
Digit Symbol	.577	.349	.038	.161	.076	.382		.223	.566	.495	.182	.335	.593	.494
Pict. Comp.	.571	.493	.506	.033	.286	.530	.223		.627	.354	.312	.614	.715	.723
Block Design	.681	.575	.388	.268	.076	.572	.566	.627		.657	.551	.583	.909	.826
Pict Arran.	695	.663	.516	-.040	-.025	.757	.495	.354	.657		.500	.562	.748	.729
Obj. Assem.	.339	.205	.152	-.284	.151	.524	.182	.312	.551	.500		.305	.731	.563
Verbal I.Q.	.883	.813	.731	.312	.676	.843	.335	.614	.583	.562	.305		.618	.912
Perf I.Q.	.720	.565	.404	-.014	,164	.702	.593	.715	.909	.748	.731	.618		.882
F. S. I.Q.	.893	.784	.646	.193	.479	.860	.494	.723	.826	.729	.563	.912	.882	

TABLE 5

IMPORTANT CORRELATIONS ON WAIS SUBTESTS WITHIN RACES

Correlations of Test Titles	White	Negro
Information and Comprehension	.61	.72
Information and Similarities	.76	.27
Information and Vocabulary	.78	.88
Information and Verbal I.Q.	.83	.88
Information and Performance I.Q.	.57	.72
Information and Full Scale I.Q.	.83	.89
Comprehension and Similarities	.73	.07
Comprehension and Arithmetic	.60	.71
Comprehension and Verbal I.Q.	.85	.81
Comprehension and Full Scale I..Q.	.75	.78
Comprehension and Vocabulary	.72	.69
Arithmetic and Verbal I.Q.	.80	.73
Arithmetic and Digit Span	.72	.27
Vocabulary and Picture Arrangement	.25	.76
Vocabulary and Verbal I.Q.	.88	.84
Vocabulary and Performance I. Q.	.52	.70
Vocabulary and Full Scale I.Q.	.84	.86
Picture Completion and Performance I.Q.	.29	.71
Picture Completion and Full Scale I.Q.	.42	.72
Block Design and Performance I.Q.	.77	.91
Block Design and Full Scale I.Q.	.63	.83
Verbal I.Q. and Full Scale I. Q.	.90	.91
Performance I.Q. and Full Scale I. Q.	.80	.88

Note: Condensed from Table 3 and Table 4.

Discussion

When the samples were matched for total I.Q., the pattern found by Stodolsky and Lesser did not emerge for Negroes. Whites were not reported in the Stodolsky study. Negroes, as clearly demonstrated in Figure 2 and Figure 3, were, if anything, superior to whites in number. Associative tasks were their forte, in this sample.

In order to fit the WAIS subtests into somewhat the same framework as that used by Stodolsky & Lesser I will attempt to classify them in that way as follows: Verbal skills, according to the definition quoted earlier, are measured by information, comprehension, and vocabulary. Reasoning ability, defined earlier, is measured by similarities, picture arrangement, digit symbol and picture completion. Number is measured by digit span and arithmetic. Space conceptualization is covered by block design, and object assembly.

Whites seem to fare better, significantly so, in space conceptualization as indicated in the performance on object assembly, whereas Blacks perform at a higher level in verbal tasks, as demonstrated in particular on the comprehension test. The Negro will probably do well in the language and social science fields, because of this.

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